2d. That mere isolation from the air, as by placing the heart in oil, does not alter the rate of the heart's movements for some time, but lessens their ultimate duration.

3d. That water at aërial temperatures stimulates the heart, and very soon causes it to cease to pulsate. That water at higher temperatures, as 100° F. to 113° F., produces much more rapidly the same results.

4th. That glycerine at aërial temperatures affects the heart but little except as shortening the time during which it continues to pulsate. That glycerine, at 32° F., depresses the heart's action, lessening the number of pulses per minute at least one-half, and soon checking its movements altogether.

5th. That olive oil at 32° F. affected the heart very little at first as to the number of beats per minute, but soon rendered them feeble, and finally stopped them, though at the close of a longer interval than was required by glycerine at the same temperature.[1]

6th. That when the heart has ceased to respond to one stimulus, however violent, it will usually remain sensitive to others apparently far less powerful.

ART. VI.—*Observations on the Colourless Blood-corpuscle.* By WILLIAM A. HAMMOND, M. D., Assistant Surgeon U. S. Army. (Read before the Academy of Natural Sciences of Philadelphia, Biological Department, February 7th, 1859. Recommended for publication, February 21st, 1859.)

THE white blood-corpuscle, whether we regard it as the first or intermediate stage in the development of the red disk, or admit that we are unable to designate its uses, is entitled to far more consideration from physiologists than has, until recently, been awarded to it. Of late, however, through the researches of Wharton Jones, Virchow, Bennett, and others, it has attracted more particularly the attention of biologists, and perhaps ere long we may be enabled to understand its use in the economy.

The object of the present paper is to aid somewhat in the elucidation of one or two points of interest connected with this body, the principal of which relates to its persistence in its normal form in dried blood.

At the last meeting of the Department it will be recollected that in answer to an inquiry by my friend Dr. Woodward, I stated I had been unable

[1] The glycerine was thinner than the English glycerine (Price's) now in use, and altogether was a much less reliable article. For this reason I do not entirely trust the results observed when using glycerine.

to detect the white globule in blood dried on a glass slide, and that I did not believe it would remain intact under such circumstances.

It is, however, necessary that I should modify this opinion, as I have frequently since perceived these corpuscles, perfectly unaltered in blood which had been dried in the manner above stated. This has been more especially the case in the blood of reptiles, the corpuscles of which, however, both white and red, differ in many essential points from those of the mammalia.

Human blood, when dried upon glass or other hard substance, seldom retains its white corpuscles intact for any length of time. If exposed to the atmosphere for a few hours they break up, and can only be recognized by the remains of their walls. There are, however, bodies to be perceived in dried human blood which can with difficulty be distinguished, at first sight, from the dry, white corpuscle, except by the circumstance that they are of no uniform size. I have always regarded them as consisting of fat, and have recently ascertained that they are perfectly soluble in ether. A fact which may readily lead to the supposition that they are the white corpuscles is, that they are distinctly granular, and present, many of them, the appearance of containing a well-defined nucleus.

That they are really not such can be proven conclusively by mixing a little alcohol or ether with blood, and filtering off the supernatant fluid. A drop of this latter placed upon a glass slide, and allowed to evaporate, deposits numbers of these granular, fatty globules, most of them about the size of the white corpuscle. They are readily soluble again in the ether or alcohol, and to an experienced eye present other points of difference from the colourless corpuscle. Nevertheless a hasty examination, or a want of familiarity with the subject, might easily lead to the inference that they were veritable, colourless blood-corpuscles.

It is asserted by Robin, and recently reiterated by Flemings,[1] that the human white corpuscle is completely broken up in the act of the blood drying. Wyman, however, denies that any such disintegration occurs, and asserts that the colourless corpuscle is even more persistent than the red.

From my own observations I am satisfied that the red corpuscle will, under similar circumstances, remain much longer intact than the white. As above stated, I have never found the latter to remain in blood dried on glass, and exposed to the atmosphere, more than a few hours, whereas no difficulty is experienced in keeping the red disk, under such conditions, for several years.

With a view, however, still further to elucidate the subject, I soaked small pieces of cotton cloth in human blood, and examined them at different periods afterwards, as follows.

At the end of twenty-four hours I washed out one of the pieces with the

[1] American Journal of the Medical Sciences, January, 1859, p. 84.

filtered serum of frog's blood. Upon inspection with the microscope, the white corpuscles were generally perceived unaltered; a few were broken up. The red disks were contracted, but regained their ordinary size and form after floating a few minutes in the serum.

At the end of forty-eight hours a few white corpuscles were still found unbroken. The majority, however, were disintegrated, but the remains of their walls were still to be seen. The red corpuscles, as before, regained their normal form by endosmosis.

After seventy-two hours had expired the white corpuscles had entirely undergone disintegration, but the red disks still remained intact.

At the end of fifteen days the red corpuscles regained their ordinary size after maceration in the serum, but no trace of the white corpuscles could be found, beyond a few irregular fragments, which were probably the remains of the cell walls.

These experiments were repeated with several specimens of human blood, and that of other mammals, with similar results. From them it is seen that the white corpuscle did not retain its normal form after the third day, but became broken up into fragments, the contents of course escaping.

In human blood, dried in a thin film and covered immediately with thin glass, to the edges of which a cement impervious to air and moisture has been applied, the white corpuscle remains in a state of integrity for a considerable period; how long I am not prepared to say at present. Certainly, however, for at least fifteen days.

As an evidence of the presence of blood, the white corpuscle cannot be regarded as affording as valuable indications as the red. As a means of discriminating between the different kinds of blood nothing of importance has yet been done to warrant our expressing a definite opinion of its value. It is not, however, probable that much can be claimed for it in this respect. Its form being the same in all animals, would require us to rely entirely on its size, which does not vary greatly among the mammalia, probably not even to the same extent as the red corpuscle. In reptiles, birds, and fish, it is much larger than in mammals, but here the form of the red corpuscle furnishes much more valuable indications.

ART. VII.—*Cases of Gangrene of the Lungs treated in the New York Hospital from January*, 1857, *to September*, 1858. Reported by B. DARRACH, M. D., Resident Physician.

CASE I. *Gangrene of the Lung preceded by a sense of Stuffing in the side, Pain, and Paroxysmal Cough; Hæmoptysis. Discharged without relief.*—James Foster, aged 33, native of Ireland, country storekeeper, resident of Pennsylvania, was admitted into the New York Hospital, July 7th,